

Title: Persulfidation of cysteine residues govern protein function and provide protection during oxidative stress

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Abstract:

In the field of Redox Biology, protein cysteine persulfidation (P-Cys-SSH) and polysulfidation (P-Cys-SSxH) is gaining increasing attention as an important regulatory element of protein functions. We demonstrated that protein Cys per/polysulfidation is highly regulated via the NADPH-dependent reducing machineries, the thioredoxin and glutathione systems. We have shown that persulfidation has a regulatory role on a number of protein functions and recently we also obtained evidence that these modifications have important protein protecting functions in cells and in vivo. In cellular systems a substantial fraction of important thiol proteins (such as peroxiredoxins, PTP1B, PTEN, KEAP1 or Hsp90) are present in their persulfidated state, which we propose is a preemptive mechanism to prevent them from overoxidation during oxidative stress. We demonstrated that protection is due to formation of perthio-sulfenic, sulfenic and sulfonic acid derivatives (Cys-SSO₁₋₃H), which can be reduced back by the thioredoxin system to the corresponding functional native thiol forms when the stress is over.

【References】

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- 2) Éva Dóka et. al. Novel persulfide detection method reveals protein persulfide and polysulfide reducing functions of thioredoxin- and glutathione-systems. **Science Advances** (2016) 2(1):e1500968.
- 3) Romy Greiner et. al. Polysulfides link H₂S to protein thiol oxidation. **Antioxidants and Redox Signaling** (2013) 19(15), 1749-1765.

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